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Pages: 5

Patent
TRU-2160 Multi-Wax

Expedited Procedure
After-Final Amendment

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.:	10/685,652	**Confirmation No.:**	5654
Applicant:	Benjamin J. Sun	**Art Unit:**	1791
Filing Date:	October 16, 2003	**Examiner:**	Matthew J. Daniels

Mail Stop: AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION UNDER 37 C.F.R §1.132

Dear Sir:

I, the undersigned, BENJAMIN J. SUN, hereby declare that:

I have a Doctor of Philosophy Degree in Chemistry from the University of Southern California;

I have been employed by Dentsply International Inc. since 1998 and currently hold the position of Principal Research Scientist;

I am one of the joint inventors of the invention claimed in United States Patent Application Serial No. 10/685,652 filed October 16, 2003;

In response to the final rejection of the above-identified patent application I carried out a set of experiments to demonstrate that my invention is different than the subject matter disclosed in Waknine et al., US Patent 5,348,475;

The experiments involved preparing the following Composition A, which is a light-curable, wax-like polymerizable material made in accordance with the claims of the above-identified application;

Composition A

Oligomer* - 53.50 %
Monomer** - 41.22 %
Stearyl acrylate (SR 257 from Sartomer) - 4.50 %
γ – methacryloxypropyl-silane - 0.07 %
Camphorquinone - 0.05 %
Butylated hydroxytoluene - 0.005 %
Lucirin TPO - 0.35 %
Methacrylic Acid - 0.09 %
Pigments and red fibers - 0.035 %

* The oligomer was prepared as follows. A reactor was charged with 1176 grams of trimethyl-1,6-diisocyanatohexane (5.59 mol) and 1064 grams of bisphenol A propoxylate (3.09 mol) under dry nitrogen flow and heated to about 65°C under positive nitrogen pressure. To this reaction mixture, 10 drops of catalyst dibutyltin dilaurate were added. The temperature of the reaction mixture was maintained between 65°C and 140°C for about 70 minutes and followed by additional 10 drops of catalyst dibutyltin dilaurate. A viscous paste-like isocyanate end-capped intermediate product was formed and stirred for 100 minutes. To this intermediate product, 662 grams (5.09 mol) of 2-hydroxyethyl methacrylate and 7.0 grams of BHT as an inhibitor were added over a period of 70 minutes while the reaction temperature was maintained between 68°C. and 90°C. After about five hours stirring under 70°C, the heat was turned off, and oligomer was collected from the reactor as semi-translucent flexible solid and stored in a dry atmosphere.

** The monomer was prepared as follows. A reaction flask was charged with 700 grams of 1,6-diisocyanatohexane and heated to about 70°C under positive nitrogen pressure. To this reactor, 1027 grams of 2-hydroxyethyl methacrylate, 0.75 gram of catalyst dibutyltin dilaurate and 4.5 grams of butylated hydroxy toluene (BHT) were added slowly under dry nitrogen flow over a period of two hours. The temperature of the reaction mixture was maintained between 70°C and 90°C for another two hours and followed by the addition of 8.5 grams of purified water. One hour later, the reaction product was discharged as clear liquid into plastic containers and cooled to form a white solid and stored in a dry atmosphere.

To demonstrate the properties of dental formulations that contain conventional monomers and oligomers, as described in US Patent 5,348,475 ("Waknine"), the following Composition B was prepared. The formulation in Example 1 of the '475 (Waknine) Patent was studied and replicated to the extent feasible. The components in Composition B along with a comparison between Composition B and formulation in Example 1 are provided below;

Composition B

a.) 20 grams of triethylene glycol dimethacrylate. (*Ex. 1 in the Waknine Patent describes using 20-60 grams of "polycarbonate dimethacrylate");

b.) 10 grams of Bis-GMA and 10 grams of UDMA. (*Ex. 1 describes using 15-40 grams of "Bis-GMA/UDMA");

c.) 10 grams of 2-hydroxyethylmethacrylate. (*Ex. 1 describes using 0-40 grams of "2-hydroxyethylmethacrylate/TEGDMA");

d.) 0.10 grams of camphorquinone. (*Ex. 1 describes using 0.05-0.20 grams of "d,l camphoroquinone", a visible light cure initiator);

e.) 0.20 grams of diethylaminoethylmethacrylate. (*Ex. 1 describes using 0.20-0.50 grams of "diethylaminoethylmethacrylate", a visible light cure accelerator); and

f.) 0.01 grams of benzoylhydroxytoluidine. (*Ex. 1 describes using 0.01-0.15 grams of benzoylhydroxytoluidine (BHT);

g.) in an admixture with from about 40-95% by weight of barium borosilicate, 1-15 weight % gamma.-methacryloxypropyltrimethoxysilane and 1-50 weight % of colloidal amorphous silica as filler, such that a 100% filled polymer resin system is obtained. (*Ex. 1 describes using the same admixture.)

h.) Other ingredients in Ex. 1 are described as being used in trace amounts (particularly, 0.5-1.5 grams of an ultraviolet absorber; 0.005-0.5 grams of fluorescent whitening agent; and 0.1-2.0 grams of a light stabilizer.) These additives would have no material effect on the properties of Composition B, which are relevant to the present analysis; thus, they were not added to the formulation of Composition B.

Compositions A and B, as prepared in the manner described above, were evaluated to determine their properties and the results are reported in Table 1 below;

Table 1

Example	**Properties**
Composition A	Composition "A" was flowable at temperatures greater than 40°C and the composition solidified at a temperature of 23°C after the composition was left standing for 5 minutes. The composition was dimensionally stable.
Composition B	Composition "B" had a paste-like consistency and was flowable at temperatures greater than 40°C using light finger pressure and the composition maintained these properties when the temperature was lowered to 23°C after the composition was left standing at this lowered temperature for 5 minutes. That is, the composition had a paste-like consistency and remained flowable at 23°C. The composition was easy to deform and compress using slight finger pressure. It was observed that Composition B was a liquid material when no fillers were included in the formulation. Adding the fillers to the formulation caused the viscosity and flow characteristics of the formulation to change. The material became paste-like, but it remained flowable at temperatures of 40°C and 23°C.

And, the results of the experiments, as set forth in Table 1 above, show that Composition A is a wax-like material, as defined by the specification of the subject application, while Composition B is not a wax-like material.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Benjamin J. Sun

Dated 9-18-08